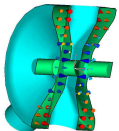


TUNER FOR THE AAA $\beta=0.175$ SPOKE RESONATOR

**Dale Schrage
LANL**

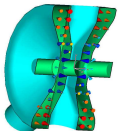
**Workshop on the Advanced
Design of Spoke Resonators**

**Los Alamos, NM, USA
October 7 and 8, 2002**



AAA TUNER

- **PRELIMINARY CONCEPT BY BOB GENTZLINGER & PHIL ROYBAL**
- **TUNER REQUIREMENTS PRESENTLY NOT FIRMLY SPECIFIED**
 - **MAIN REQUIREMENT IS TO DE-TUNE CAVITY BY 30 kHz IN < 150 msec**
- **MUST INTEGRATE INTO CAVITY, HELIUM VESSEL, AND CRYOMODULE DESIGN**



PRELIMINARY TUNER REQUIREMENTS

$\beta = 0.175$, 2-GAP CAVITY, FREQUENCY SENSITIVITY ~ 1.0 MHz/mm
1485 kg/mm

$\beta = 0.340$, 5-GAP CAVITY, FREQUENCY SENSITIVITY ~ 0.2 MHz/mm
1485 kg/mm

FAST TUNING REQUIREMENT:

FOR ADTF: MUST TAKE CAVITY OFF RESONANCE IN 300 msec

ALLOW 150 msec TO CHANGE CAVITY FREQUENCY 30 kHz

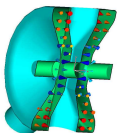
$\beta = 0.34$, 5-GAP CAVITY IS WORST CASE

$\delta = 0.15$ mm, 223 kg

SLOW CAVITY TUNING REQUIREMENT:

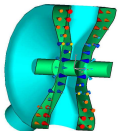
FOR ADTF: $\beta = 0.34$, 5-GAP CAVITY IS WORST CASE

$\delta = 2.5$ mm, 3712 kg

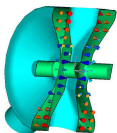
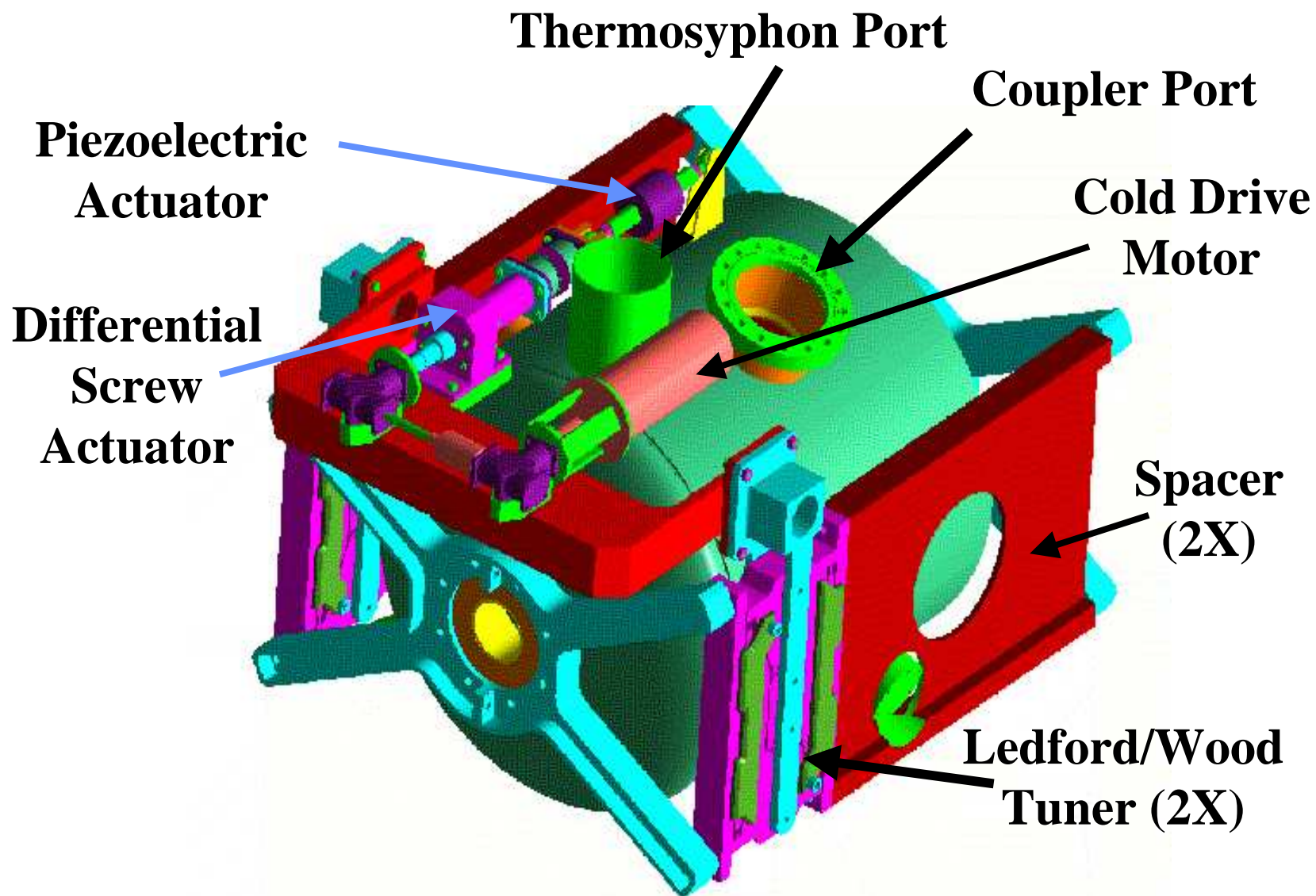


PRELIMINARY TUNER CONCEPT

- **SEPARATE SYSTEMS FOR FAST AND SLOW REQUIREMENTS**
- **USE SCREW-DRIVE MECHANISM FOR SLOW CAVITY TUNING REQUIREMENT**
- **USE PIEZOELECTRIC ACTUATOR FOR FAST TUNING REQUIREMENT**
- **BOTH ACT ON CAVITY BEAM TUBE**



CAVITY ASSY w/TUNER



UNDESIRABLE FEATURES

- **MOTOR INSIDE CRYOMODULE**
 - CAREFUL SELECTION REQUIRED
- **GEARBOX INSIDE CRYOMODULE**
 - LUBRICATION IS A CONCERN
- **PZT INSIDE CRYOMODULE**
 - SOME PROTOTYPING WILL BE REQUIRED

